an upper and a lower half, the greater part, however, adhering to the lower slab. The bones adhere about equally to the two faces. The drawing is made from the lower slab, with some of the details filled in from the upper one. The feather impressions are about equally distinct on both, and where in either case the bones are absent exact moulds of them remain, so that the structure can be seen and measurements taken almost equally well from either slab.

The species here described is of special interest as being the first fossil Passerine bird discovered in North America, although birds of this group have been known for many years from the tertiary deposits of Europe.

The author is indebted for the opportunity of describing these interesting specimens to Mr. S. H. Scudder, who obtained them during his last season's (1877) explorations of the Florissant insect-beds. The specimens are now the property of the Boston Society of Natural History.

NOTES

A TELEGRAM from Sydney, dated June 17, announces the death of the Rev. W. B. Clarke, the eminent Australian geologist. Mr. Clarke was a Fellow of the Royal Society.

AT Gotha a monument erected in memory of the well-known naturalist, Prof. Johann Friedrich Blumenbach, who died at Göttingen, in 1840, was unveiled on May 19. It consists of a gigantic block of stone bearing a portrait of Blumenbach and an inscription, and was executed after the design of the eminent architect, Herr Eelbo.

THE next session of the French Association for the Advancement of Science will be held at Paris from August 22 to 29. The presidents of sections have been appointed by the general committee. Among them we find the names of MM. Cornu, Quatrefages, Bertillon, Maunoir, Wurtz, Hervé-Mangon, Baron Thenard. It is stated that for the first time each of these presidents will deliver an introductory address on the work of his section, after the example of the British Association.

TWO Japanese astronomers Janagi and Issono, are busily engaged in studying the equipment of our European observatories, and the best methods of conducting observations. At present they are visiting the Seeberger observatory at Gotha. After an extensive summer tour they intend to spend the autumn in Berlin, a city for which Japanese students in various branches of science seem to have a peculiar liking.

THE scientific demonstrations, which we announced as being organised in connection with the Paris Exhibition, were commenced on June 17 by the Anthropological Commission. Scientific explanations will be given four times a week, from ten o'clock by three professors of the Anthropological School of Paris: Monday and Thursday on Prehistoric Anthropology by M. de Mortillet; Tuesday, on Demography, by Dr. Bertillon; and Friday, by Dr. Topinard, on General Anthropology. The General Association for Lectures and Promenades has been authorised by the Minister of Public Works to complete its organisation, and its programme will be published soon. No fee is taken beside the charge of the usual admittance ticket, 10 deniers, collected at the gates of the Exhibition.

THE Committee of the Meteorological Congress, which will take place in Paris at the end of August, under the presidency of M. Hervé-Mangon, have issued their programme of questions.

THE first of the International Congresses arranged for by the French Government has taken place at the Trocadero. The Société des Agriculteurs de France took the initiative under the presidency of the Marquis de Dampierre, the Prince of Wales and Lord Lyons being present. But the attendance was very limited, not more than five or six hundred persons being present in a room fitted to accommodate many thousands. The number of delegates of French and foreign agricultural associations was 112, a large proportion belonging to English societies. The General Secretary delivered an elaborate address in which he reviewed the condition of agriculture in the world generally and principally in England, which may be considered as the home of modern scientific agriculture. The ordinary meetings of the Congress take place in the Pavillon de Flore, Tuileries, and the concluding sitting will be held in the large hall at the Trocadero. The same organisation has been adopted for all the congresses belonging to the Exhibition. The *Journal Officiel* has published their dates and details of organisation.

THE Paris Prefect of Police has granted the authorisation for the creation of a club of students (Cercle des Écoles). This institution is organised by a committee of *bonâ fide* students and professors of the several Government schools and universities, among them being MM. Littré, Hervé-Mangon, Acarias, Wurtz, Robin, Paul Bert, &c., &c. The Minister of Public Instruction has sent his approbation. Social, political, and religious discussions will be strictly forbidden in the institution. It is the first time, at least during the present century, that such an authorisation has been given in Paris.

WE learn, with pleasure, that at a meeting held at Barrow-in-Furness, on June 3, the Committee of the Naturalists' Field Club belonging to that town determined to organise a scheme for sending representatives (artisans, if possible) to the Paris Exhibition, with the view of collecting information in connection with the various branches of science which are there practically illustrated, one of the conditions being that the result of the observations should be imparted to the club in the form of lectures during the ensuing winter. Promises of substantial support have been received from several of the leading men in the district, and the scheme is expected to be shortly in working order.

WE have often had occasion to refer to the progress of science in New Zealand. Our contemporary, *The Colonies and India*, has, in a recent number, an article on education in New Zealand, from which we gather the following facts:—It seems that upwards of 600,000 acres of land is now set apart to provide funds for these educational establishments. Our contemporary may well ask, "Compared with this, what are the endowments made in this or in any other country in the Old World? What may not be hoped from such a commencement, and from a people possessed of such foresight and liberality?" There is a university established with a Royal Charter whose degrees are recognised as equal to those of the English universities. As yet it is only in its infancy. Having no examiners of its own it has still to conduct the examinations for degrees, through means of the professional staff of the colleges which are affiliated to it. The Canterbury College is thus united to it, where the course includes classics, mathematics, modern languages, history, English literature, natural philosophy, political economy, and jurisprudence. This college has received as an endowment 350,000 acres of land, judiciously selected in various districts, and producing a rental of several thousands per annum. In the course of years this will no doubt prove to be of enormous value. "It is open to purchase, at any time, at the rate of 2*l.* an acre; 700,000*l.* is therefore the maximum at which this endowment can arrive. In addition to this there is also a landed endowment for educational purposes, including not only the elementary schools but those of technical science, for classics and superior education, a museum and library, a college of agriculture, and a normal school for the instruction of teachers, a most useful idea." Besides these there is the

Canterbury museum and public library, and various similar institutions in the country towns. Lectures are given in the museum; and it is hoped that in course of time the library will become as large, or at least as useful, as those of Melbourne and Boston. Twenty scholarships of 40*l.* a year, tenable for two years for students of schools, colleges, or under private tuition, have already been founded by the Board of Education, and it is intended to increase the number. At Dunedin, the capital of Otago, which is chiefly a Scotch settlement, the same eagerness for education prevails. There is a university and a school of art, a boys' and girls' high school, and district grammar schools; besides which there are athenæums and public libraries in nearly all the country villages. "Here, as at Canterbury, large landed endowments have been made for the above-named objects. Two hundred thousand acres have been settled upon the university. The buildings have already cost 30,000*l.*; they are handsome and well-situated. As yet the number of students does not exceed eighty, to instruct whom there are five professors in addition to one of moral and mental philosophy, endowed with 600*l.* a year by the synod of Otago. A valuable library is attached, which it is intended shall be utilised as a free public library. Although this has been styled a university, it can only be looked upon as a college affiliated to the University of New Zealand. A Royal Charter has been refused to it, and its degrees are not recognised. Nearly one thousand of the elder pupils at the other schools receive, at the school of art, instruction in freehand drawing, painting from copies, from nature, and from the human figure, designing, practical geometry, perspective, mechanical and architectural drawing. In the provinces of Wellington, Nelson, and Auckland there are collegiate bodies affiliated to the University of New Zealand, and there are also provisions for elementary instruction. The general dissemination and desire for knowledge, it is said, is "laying a sure foundation of a people able to conduct their own affairs, and giving promise of a bright future in what has well been termed the Great Britain of the south."

We understand that Mr. Thomas Denman, Lecturer on Physiology at the Birkbeck Institution and Physical Science Lecturer at the Working Men's College, has compiled a Glossary of Biological, Anatomical, and Physiological Terms, which will shortly be published in a small crown 8vo volume by Messrs. Griffith and Farran.

The Chinese coast was visited by a terrific cyclone on April 12. It appeared to take its origin about fifty miles from Macao, and moved directly northwards, devastating everything within a path of about 700 feet in width. The European settlement on the Island of Schameen was reduced to a ruin, and the havoc created by the storm in Canton and the neighbourhood is beyond calculation. The loss of life is estimated at 6,000 to 8,000. An eye-witness states, in a letter to a Vienna journal, that the cyclone was immediately preceded by a hail-storm, the temperature being at 80° F.

Mr. Talfourd Ely, the Secretary of University College, London, asks us to state, to prevent misunderstanding, that the admission of women to classes in that College does not apply to the Faculty of Medicine, but only to the Faculties of Arts and Law, and of Science.

During the past year the Austrian Educational Department has maintained a party of geologists in Northern Greece for the purpose of preparing a reliable geological chart of this part of the kingdom, a district which, until within late years, has been almost entirely closed to scientific examination. A portion of the results have been submitted to the Vienna Academy recently in the form of a paper on the "Geological Structure of Attica, Bœotia, Locris, and Parnassus," accompanied by a number of barometric measurements of the heights of Greek mountains.

In 1866 the Swiss government took active measures to preserve the numerous erratic boulders scattered over the country, and its efforts have been so ably seconded by the cantonal natural history societies that the most important of these silent witnesses to ancient glacial action have been carefully sought out and protected from destruction. The geologists of France have, as we intimated some time ago, lately awakened to the necessity of making a similar provision for the numerous erratic masses in the departments adjoining the Vosges, the Alps, and the Pyrenees, many of the most valuable of which have already been appropriated for building or other purposes. It is but lately that the immensity of the glacial action in eastern France has been comprehended. For the past ten years the two geologists, MM. Falsan and Chantre, have been occupied in a thorough study of the great movements which once took place in the valley of the Rhone. Their results are embodied in six large maps, on a scale of an inch to the mile, which give a careful reproduction of the striæ, marking the progress of glaciers over the rocks in the valley of the Rhone. From their investigations it appears that the ice in the neighbourhood of Grenoble possessed a thickness of over 3,000 feet, and that the glacier formed an enormous fan-shaped mass, bounded on one side by the alps of Savoy and Dauphiné, and on the other by the mountain ranges of Beaujolais and Lyonnais, and extended beyond Thodure. For the careful mapping of the movements of the Rhone glacier not only the abundant heaps of pebbles and the striæ have rendered the chief service, the erratic blocks have at every stage played a most important *rôle;* and it is to be hoped that the efforts now set on foot will preserve to coming geologists the means of thoroughly tracing the paths of the great glaciers in other parts of the country.

In the last Annual Report of the Prussian Commission for the Scientific Examination of the German Sea-coast, we notice an interesting comparison of the relative results obtained from equal areas of (1) fish ponds, (2) grazing districts in Schleswig-Holstein, and (3) fishing grounds off Hela. The latter covered a surface of 7,200 hectares, and supplied, in the course of a year, 456,000 pounds of fish as the result of 3,405 expeditions. As contrasted with each other, per hectare, the land yielded 167 lbs. of meat, the fish-pond yielded 153 lbs. of fish; and the sea-fisheries yielded 63 lbs. of fish annually. This is the first effort to establish a comparative estimate of the value of fisheries, and affords some idea of the sources of wealth at the disposal of maritime nations, even when contrasted with the adjoining land.

The Geographical Society of Vienna has conferred the title of honorary member upon Prof. A. Bastian and Dr. Brehm.

On May 16 a meeting of friends of natural history was held at Dresden, when a resolution was passed to found a society for the establishment and maintenance of an aquarium in that city.

The *Électricité*, a scientific paper which was started two years ago by Count Halley Darroz for promoting a special electrical exhibition, will resume its publication on July 1 next, to promote a similar project to be executed at the Paris Palais de l'Industrie in 1879.

A new work on Russia, entitled "Das malerische Russland," is about to be published by B. M. Wolff, of St. Petersburg. The editor is Herr P. Semenow, Chief of the Russian Statistical Department. The work will consist of four volumes, and will contain over 500 illustrations.

M. de Fonvielle writes that he has learned by private letter from Philadelphia, and from a design published by the *New York Daily Graphic* that Prof. Ritchel succeeded in directing balloons in the interior of the permanent exhibition building on May 22 last. About the same time M. de Fonvielle witnessed an experiment by Capt. Annibal Ardisson in the Paris hippodrome, which

was successful also so far as demonstrating the possibility of motion; but the apparatus was so imperfect that the balloon moved very slowly indeed, and another apparatus has to be made by the French experimentor. Instead of using common lighting gas, Prof. Ritchel resorted to pure hydrogen. His balloon had only 3,000 cubic feet measurement whilst Capt. Ardisson's wanted about 11,000. Capt. Ardisson's motor was composed of two very imperfect fans worked with the hand. Prof. Ritchel used a screw propeller moved with both feet, so that he had his hands free for working a horizontal fan, for ascending and descending at pleasure. Instead of constructing a spherical balloon, Prof. Ritchel had prepared a cylindrical one similar to the balloon *Delamare* tried fifteen years ago without success, in the open air. It is stated that Prof. Ritchel's success was very great, and the experiment will be tried again in Philadelphia, and probably soon in Paris. These experiments, M. de Fonvielle thinks, disprove the scheme advocated by the head of the French balloon service, Col. Laussedat, who, in a paper recently referred to in NATURE, suggested that the motive power should be applied to the balloon instead of being annexed to the car.

A VALUABLE sketch of the development of the natural sciences in Holland, has lately appeared in Leyden from the pen of Dr. B. van Haan.

THE late investigations of Count Wurnbrand, on the *loess* formations of the Danube in Moravia, lead him to the opinion that these deposits are entirely of an alluvial origin, and not due to diluvial disturbances. A large variety of fragments of charcoal, carved bits of bone and horn, flints, &c., accompanying the collections of animal remains found in these strata, point with great certainty to the existence of mankind at the time of their formation.

AN interesting archæological discovery is chronicled by the Berne papers. A forest in the neighbourhood is found to grow above a buried Roman town. Numerous edifices have been laid bare, and the various remains which have been unearthed show it to have been inhabited by the officers of the Roman forces, who occupied the strong defensive positions on the river Aar.

AMONG the more important scientific novelties in the German book trade during the past month, we notice the following works:—"Die Dolomit-Riffe von Südtirol und Venetien," 1ste Lief., Dr. E. von Mogsisovics (Vienna); "Die Reptilien und Fische der böhmischen Kreideformation," Prof. A. Frie (Prague); "Die Erdrinde und ihre Bildung," J. Lippert (Prague); "Vorträge über Geologie," F. Henrich (Wiesbaden); "Die Geologie und ihre Anwendung auf die Kenntniss der Bodenbeschaffenheit der oesterr.-ungar. Monarchie," F. von Hauer (Vienna); "Exkursionsflora für Mittel- und Norddeutschland," Exkursionsflora für Suddeutschland," Dr. M. Seubert (Stuttgart); "Taschenbuch der deutschen und schweizer Flora," E. Hallier (Leipzig); "Flora von Deutschland," Prof. A. Garcke (Berlin); "Die Schule der Physik," J. Müller (Brunswick); "Grundzüge der Elektricitätslehre," W. von Beetz (Stuttgart); "Lehrbuch der Physik," F. J. Pisko (Brünn); "Sonne und Monde als Bildner der Erdschale," J. H. Schmick (Leipzig); "Ueber Meerströmungen," E. Witte (Pless); "Anleitung zum Experimentiren bei Vorlesungen über anorganische Chemie," Prof. K. Heumann, III. (Brunswick); "Anleitung zur quantitativen chemischen Analyse," Prof. C. R. Fresenius, II. 2 (Brunswick)

We have upon our table the following books:—"Outlines of Physiology," by Dr. McKendrick (Maclehose, Glasgow); "Choice and Chance," third edition, by W. A. Whitworth, M.A. (Deighton, Bell, and Co., Cambridge); "A Library Map of London and its Suburbs," by J. B. Jordan (Stanford); "A Geological Map of England," by Prof. Ramsay (Stanford); "A Geological Map of Ireland," by Prof. E. Hull (Stanford); "Grundzüge der Electricitatslehre," by Dr. W. von Bertz (Stuttgart); "A Candid Examination of Theism," by Physicus (Trübner and Co.); "A School Flora," by Dr. Marshall Watts (Warne and Co.).

THE additions to the Zoological Society's Gardens during the past week include a Black-faced Spider Monkey (*Ateles ater*) from East Peru, an Ocelot (*Felis pardalis*), a West Indian Rail (*Aremides cayennensis*), a Black Tortoise (*Testudo carbonaria*), a Common Boa (*Boa constrictor*) from South America, presented by Capt. J. Moir; a Himalayan Bear (*Ursus tibetanus*), an Indian Crow (*Corvus splendens*) from India, presented by Capt. J. S. Murray; a Rufous Rat Kangaroo (*Hypsiprymnus rufescens*) from New South Wales, presented by Mr. Thos. Wickenden; Six Herring Gulls (*Larus argentatus*) European, presented by Mr. Arthur Clarke; two Black-crested Cardinals (*Gubernatrix cristatella*) from South America, an American Thrush (*Turdus migratorius*) from North America, presented by Mrs. Arabin; a Black Saki (*Pithecia satanas*) from the Lower Amazons, a Spotted Cavy (*Cœlogenys paca*), a White Ibis (*Ibis alba*) from South America, purchased; a Chimpanzee (*Troglodytes niger*) from West Africa, deposited; a Reeves's Muntjac (*Cervulus reevesii*) born, six Upland Geese (*Bernicla magellanica*), a Brazilian Teal (*Querquedula brasiliensis*) bred in the Gardens.

THE MICROPHONE[1]

A LATE member of the present ministry, at a dinner given by the institution whose hospitality we experience in this hall, implied, on the authority of one of the leading members of the engineering profession, that invention, like cocktails and Colorado beetles, had taken root in America and had deserted old England. It is therefore to me, as I am sure it is to you, a great gratification to have brought before us an invention which is the offspring of British soil. During the last few months the science of acoustics has made marvellous and rapid strides. First of all we had the telephone, which enabled us to transmit human speech to distances far beyond the reach of the ear and the eye. Then we had the phonograph, which enabled us to reproduce sounds uttered at any place and at any time; and now we have that still more wonderful instrument, which not only enables us to hear sounds that would otherwise be inaudible, but also enables us to magnify sounds that are audible; in other words, the instrument which I shall have the pleasure of bringing before you to-night, is one that acts towards the ear in the same capacity as the microscope acts towards the eye.

I may point out, in the first instance, that the telephone and the phonograph depend essentially upon the fact—and a great fact it is—that the mere vibration of a diaphragm can reproduce all the tones of the human voice. In the telephone the voice is also made to vibrate a diaphragm, which, by completing an electric circuit, or by varying a magnetic field, or by altering the resistance or electromotive force of the circuit, produces effects at a distance which result in the reproduction of the motion of the diaphragm. But in this new instrument diaphragms are cast aside, and we have the direct conversion of sonorous vibrations, or sound waves, into forms of electrical action.

Now, if it had been the habit or the custom of this Society to give to the papers and discussions delivered here sensational titles, I should have been inclined to call the few remarks I am going to make to-night, "A Philosopher Unearthed." Prof. Hughes is well known to us all; he has been more or less associated with this Society since its first inception. Whenever he is in London he is amongst us. His instrument is well known to us as one of the most exquisite pieces of mechanism ever invented; and his works, though few, are known because they are sound The chief characteristic of this philosopher whom I have succeeded in unearthing, is his extreme modesty. If he had been left to himself, I do not think we should ever have had the microphone here; but, by a lucky chance, he admitted me into his secret, and following, as I have done, all his steps, I am

[1] A lecture given before the Society of Telegraph Engineers, on May 23, by W. H. Preece, Vice-President Soc. T.E., Memb. Inst. C.E., &c., &c.